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Before the

Federal Communications Commission  
Washington, D.C. 20554

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PR Docket No. 93-60  
DISPATCHED BY

In the Matter of

Co-Channel Protection Criteria  
for Part 90, Subpart S Stations  
Operating Above 800 MHz

RM-8028

## REPORT AND ORDER

Adopted: September 22, 1993; Released: October 8, 1993

By the Commission:

### I. INTRODUCTION

1. This *Report and Order* amends Section 90.621 of the Commission's Rules, 47 C.F.R. § 90.621, to revise the co-channel interference protection criteria for private land mobile radio (PLMR) base stations operating above 800 MHz in all Part 90, Subpart S service pools. The current minimum co-channel station separation of 113 km (70 mi) will remain as the standard for assignments of Specialized Mobile Radio (SMR) stations and will now also be applied to non-SMR stations operating in the 800/900 MHz bands.<sup>1</sup> Distances of proposed stations that are less than 113 km (70 mi) from existing co-channel stations will be determined through use of a Short-Spacing Separation Table (hereinafter Table), with the distances in the Table calculated based on the requirement that the 22 dBu signal strength contour of a proposed station does not fall within the 40 dBu signal strength contour of an existing station (hereinafter 40/22 dBu). This action will simplify the rules under which Subpart S systems are authorized, thereby reducing the burden on both the applicant and the Commission in the licensing process.

### II. BACKGROUND

2. Our current rules and procedures provide for different methodologies for processing applications for Specialized Mobile Radio (SMR) stations and non-SMR stations operating in the 800/900 MHz bands. In essence, pursuant to Section 90.621(b) of our Rules, applications for co-channel SMR stations are processed and granted if the stations are

generally separated by a minimum distance of 113 km (70 mi), while applications for co-channel non-SMR stations are, in accordance with Sections 90.621(c) and (d) of our Rules, processed and granted if the stations are separated by distances that result if the 40 dBu contour of an existing station is not overlapped by a proposed station's 30 dBu contour, commonly referred to as the 40/30 dBu protection criteria.<sup>2</sup> SMR stations can, however, be located closer than 113 km (70 mi) to co-channel stations by either obtaining consent from all co-channel licensees located within 113 km (70 mi), by using a Table in Section 90.621(b)(4) in which the station separations are determined from the 40/22 dBu protection criteria, or by seeking a waiver of Section 90.621(b) by showing protection to co-channel stations in accordance with the 40/30 dBu criteria.<sup>3</sup>

3. In recent years, advances in equipment performance and system design have resulted in an increased interest in low-power, multi-site private land mobile operations above 800 MHz. These advances have prompted industry concern regarding the continued viability of the current protection criteria used to separate 800/900 MHz co-channel stations, particularly in the non-SMR services. The National Association of Business and Educational Radio, Inc. (NABER) therefore petitioned us to provide the same 40/22 dBu protection criteria for co-channel stations in the Business and General Category Radio Pools that we afforded SMR systems in the Table.<sup>4</sup>

4. In response to NABER's Petition, we issued a *Notice of Proposed Rule Making (Notice)* that proposed to establish the same co-channel interference protection criteria for all 800/900 MHz stations operating pursuant to Part 90, Subpart S.<sup>5</sup> The proposed rules would establish 113 km (70 mi) as the minimum distance between co-channel stations and would adopt a Table that employs the 40/22 dBu criteria to determine appropriate distances for all Subpart S applicants wishing to locate stations less than 113 km (70 mi) from other co-channel stations without seeking a waiver of Section 90.621(b). We also asked whether the 40/30 dBu protection ratio should continue to be used as our criteria for determining station separation distances (e.g., in seeking a waiver of Section 90.621(b)) or whether 40/22 dBu is a more appropriate co-channel station protection criteria. The *Notice* also requested comments on the use of the Commission's R-6602 curves (upon which the current separations are based), and if other propagation prediction methodologies or means of determining station separations, whether performed by the applicant, a frequency coordinator, or the Commission, would be more appropriate. Comments were also requested on the issue of co-channel interference to and from mobile units, including the effect of limiting mobile unit effective radiated power (ERP). Twelve comments and seven replies were filed in response to the *Notice*.<sup>6</sup>

<sup>1</sup> An exception to the 113 km (70 mi) minimum separation distance is made for certain specific high elevation sites in the States of California and Washington where the minimum co-channel station separation is 168 km (105 mi).

<sup>2</sup> See Second Report and Order, Docket No. 18262, 46 FCC 2d 773-775 (1974). Generally, the 40/30 dBu protection criteria results in a co-channel station separation of 113 km (70 mi) for stations operating at maximum facility parameters of 1000 watts effective radiated power (ERP) and 305 meters (1000 ft) antenna height above average terrain (HAAT).

<sup>3</sup> See Report and Order, PR Docket No. 90-34, 6 FCC Rcd 4929 (1991).

<sup>4</sup> Petition for Rulemaking, RM-8028, filed on March 6, 1992.

<sup>5</sup> *Notice of Proposed Rule Making*, PR Docket No. 93-60, 8 FCC Rcd 2454 (1993).

<sup>6</sup> Individual comments were filed by the Legislative Affairs Committee of the Region-20 Public Safety Plan Review Committee (Region-20), Fleet Call, Inc. (Fleet Call), Motorola, Inc. (Motorola), Utilities Telecommunications Council, (UTC), E.F. Johnson Company (E.F. Johnson), Federal Express Corporation

### III. DISCUSSION

#### Co-Channel Interference Protection Criteria

5. The *Notice* proposed to replace our current 40/30 dBu co-channel station separation criteria with a criteria that assumes a desired signal level of 40 dBu at the edge of a station's service area and permits an undesired (interfering) signal level of 22 dBu at this 40 dBu contour. At these signal levels, an interference protection of 18 dB is provided to a mobile operating at the edge of the station's service area. Comments were requested on whether the 40/22 dBu criteria is appropriate, and if not, what the correct protection criteria should be.

6. The use of the proposed 40/22 dBu protection criteria was supported by many commenters.<sup>7</sup> The Joint Commenters, however, propose a more conservative protection criteria of 40/10 dBu, with the desired and undesired contour distances both taken from the R-6602 F(50,50) curves.<sup>8</sup> They claim that the R-6602, F(50,10) curves<sup>9</sup> -- now used to determine the undesired or interference contour distance -- work fairly well at longer distances, but are inaccurate at distances less than 40 miles and should be abandoned. The Joint Commenters, therefore, propose that a 12 dB correction factor (which, they contend, compensates for the difference between the F(50,50) and F(50,10) curves) be applied to the F(50,50) curves when determining the distance to the interference contour.<sup>10</sup> The Joint Commenters state that their methodology will enable co-channel assignments to be sufficiently far apart to minimize interference and yet will retain the basic premise of a 32 km (20 mi) service area and a 113 km (70 mi) station separation.

7. Our objective in this proceeding from the outset was to balance interference protection and spectrum reuse considerations when determining the appropriate interference protection criteria for these systems. While the Joint Commenters proposed 40/10 dBu ratio would provide greater interference protection because of larger separations between stations, it does so at the cost of spectrum efficiency. Furthermore, based on the record in this proceeding, and as discussed later, we are unable to conclude that the R-6602 curves are inadequate. After analysis of the comments, therefore, we conclude that a protection ratio greater than 18 dB is not warranted. A 40/22 dBu desired to undesired signal ratio will result in co-channel station

spacings that will provide reasonable protection from co-channel interference and, at the same time, provide for efficient re-use of this valuable spectrum. We, therefore, will utilize the 40/22 dBu ratio as our criteria for the licensing of co-channel stations when such stations are separated by less than 113 km (70 mi).

#### SMR and Non-SMR Systems

8. In the *Notice*, we stated that there was no apparent reason to have different protection criteria for SMR and non-SMR systems. We noted that non-SMR and SMR system designs are becoming similar and thus the applicable interference protection criteria should be the same. We also observed that separate protection criteria for SMR and non-SMR systems were restrictive, potentially confusing, and also burdensome from a licensing standpoint. We, therefore, proposed to amend the applicable rules to establish the same co-channel interference protection criteria for all Part 90, Subpart S, operations.

9. Commenters support having the same interference protection criteria for both SMR and non-SMR systems.<sup>11</sup> UTC states that because frequencies in the various 800 MHz pools are subject to intercategory sharing, applicants are increasingly requesting waivers to operate on frequencies outside of their own category. Good spectrum management, UTC claims, requires that the same interference criteria apply to all 800 MHz systems.<sup>12</sup> We agree and therefore conclude that both SMR and non-SMR stations should be licensed in accordance with the 113 km (70 mi) standard that currently applies to SMR stations. We also conclude that the 40/22 dBu criteria, when used to license stations separated by less than 113 km (70 mi), provides sufficient protection to all Part 90, Subpart S stations operating above 800 MHz, including existing Public Safety systems.<sup>13</sup> Therefore, we are adopting rules that will establish 40/22 dBu as the co-channel protection criteria for all Part 90, Subpart S stations, when such stations are separated by less than 113 km (70 mi).

#### Co-Channel Station Separations/Short-Spacing Separation Table

10. In developing the current Table in Section 90.621(b)(4) of our Rules, we employed a 40/22 dBu criteria to determine permitted co-channel station separation distances between existing stations and proposed stations

(Fed Ex), Texas Utilities Electric Co. (TUE), Southern California Edison Company (SCE), New York City Transit Authority (Authority), and New Haven Fire Service (New Haven). Joint comments were filed by the City of Alexandria, VA Police Department and Department of General Services, (Alexandria), and the National Association for Business and Educational Radio, Inc., Industrial Telecommunications Association, Inc., American Mobile Telecommunications Association, Inc., and Motorola, Inc. (Joint Commenters). Reply comments were filed by the Joint Commenters, Fleet Call, Commonwealth Edison Co., (CECo), Commercial Engineering Corporation (CEC), Southern California Gas Company (SCG), Advanced MobileComm (AMI), and the City of Alexandria, VA Police Department and Fire Department.

<sup>7</sup> See Comments of Alexandria, Fleet Call, UTC, E.F. Johnson, Fed Ex, TUE, SCE, CECO, and SCG.

<sup>8</sup> FCC Report No. R-6602, Figure 29.

<sup>9</sup> FCC Report No. R-6602, Figure 30.

<sup>10</sup> Comments of Joint Commenters at 9 and 10.

<sup>11</sup> In comments at ¶¶ 11-15, Region-20 agrees with a 40/22 dBu

protection ratio for non-Public Safety systems but proposes that Public Safety systems be afforded protection based on a more conservative 40/5 dBu protection ratio.

<sup>12</sup> Comments of UTC at 4.

<sup>13</sup> Public Safety system designers have chosen to use a 40/5 dBu criteria to determine spacings for systems in the 821-824/866-869 MHz Public Safety band. This band is designated for exclusive Public Safety use and frequency assignments are made in accordance with communications plans developed by each individual public safety region (See § 90.621(i)). Frequencies in the 806-821/851-866 MHz band are available to all eligibles under the intercategory sharing provisions of Section 90.621(g). Thus, to have a separate criteria for Public Safety systems that operate outside of the 821-824/866-869 MHz band would be counterproductive and difficult to administer. We, therefore, will not adopt Region-20's recommendation that we implement a 40/5 dBu ratio when short-spacing to an existing co-channel Public Safety system, and a 40/22 dBu ratio when short-spacing to an existing co-channel non-Public Safety system.

operating at various transmitter powers and antenna heights. This provided what we considered to be an appropriate degree of protection to existing co-channel licensees from applicants wishing to locate their stations less than 113 km (70 mi) away without requesting waiver of Section 90.621 or obtaining consent of the co-channel licensee. The *Notice* proposed to amend the Table by providing protection to existing stations in accordance with their licensed transmitting powers and antenna heights, rather than, as in the current Table, in accordance with the maximum power and antenna height that a station may be authorized. The Table proposed in the *Notice* was also based upon a 40 dBu desired signal distance determined from the R-6602, F(50,50) curves and a 22 dBu undesired signal distance determined from the R-6602, F(50,10) curves. The proposed Table also retained 113 km (70 mi) as the distance between maximum facility stations (i.e. 1000 w ERP and 305 m antenna height), and established 80 km (50 mi) as the minimum short-spacing distance regardless of station parameters.

11. The majority of the commenters support the proposed Table. The Joint Commenters, however, suggest a Table with distances calculated by their proposed 40/10 dBu protection criteria (see para. 6, *supra.*). For each possible combination of transmitter power and antenna height shown in their Table, the separation is determined in both directions, i.e., proposed station to existing station and vice-versa, with the larger distance thus determined being the indicated distance for that pair of entries.<sup>14</sup> As a result of using this procedure, in addition to an existing station's 40 dBu service contour being protected from the 10 dBu interference contour of a proposed station, the 40 dBu contour of a proposed station would be protected from the 10 dBu contour of the existing station. The Joint Commenters assert that this Table will be workable for systems in the actual land mobile environment.<sup>15</sup> Fleet Call, on the other hand, claims that the Table proposed in the *Notice* is based upon a theoretical propagation model and that because there is virtually no empirical data at this time to accurately determine short-spacing distances for low-power stations, the current Table adopted in PR Docket No. 90-34 should be retained.<sup>16</sup> Fleet Call also claims that they and other SMRs are investing large sums to implement enhanced digital systems under current co-channel separation parameters, and that significantly different standards could require costly redesign and construction delays. Fleet Call asks to defer any revisions to the existing Table until completion of the Expanded Mobile Service Provider (EMSP) proceeding,<sup>17</sup> claiming that the proposed Table will impede the development of wide-

area digital SMR systems.<sup>18</sup> Alexandria proposes prohibiting short-spacing to public safety systems operating on General Category frequencies.<sup>19</sup>

12. Commenters generally agree that the current 113 km (70 mi) separation should be retained for maximum facility stations and that a minimum separation be required regardless of proposed or existing station parameters. We disagree with Fleet Call that because virtually no empirical data is available demonstrating the real-world effects of more intensive short-spacing, that we retain the current short-spacing table in the Rules, which protects all existing stations as if they were operating with maximum facilities.<sup>20</sup> For reasons given previously, we are not convinced that the Joint Commenters' procedure to use a 40/10 dBu protection criteria with station separations determined only from the R-6602, F(50,50) curves is appropriate. We also do not agree with the Joint Commenters' procedure to calculate distances in both directions (see para. 11, *supra.*), and use the larger distances thus obtained. This procedure would provide greater separations than needed and would also severely restrict a proposed low-power facility from locating less than 113 km (70 mi) from an existing high-power facility (as shown in footnote 14). Furthermore, the underlying effect of the Joint Commenters' proposal would be to dictate to a proposed licensee the amount of interference that that licensee could accept from an existing licensee. It has never been our policy to require that a prospective private land mobile radio licensee provide a particular quality of service over a given area, and we do not believe it would be appropriate at this time to impose such a requirement, e.g., through an approach used in the Joint Commenters' suggested Table.

13. The Table proposed in the *Notice* was based upon protecting an existing station in accordance with its licensed transmitting power and antenna height. This concept was proposed because we believed that it would result in more efficient use of available spectrum by permitting closer short-spacing distances. However, upon further analysis, we believe that permitting a proposed station to be short-spaced to an existing station by a distance determined from the existing station's current transmitting power would reduce the station's flexibility should it be necessary to increase transmitter power to overcome operational deficiencies. We believe that existing stations should be afforded flexibility to modify transmitter power and thus the Table that we are adopting specifies separations calculated with the assumption that, regardless of a station's licensed transmitting power, it will be protected as though it were operating at its maximum allowable power, i.e., 1000 watts ERP and at its licensed antenna height. This is consistent

<sup>14</sup> For example, using the Joint Commenters' 40/10 protection criteria, the station separation calculated for an existing station operating at 500 w ERP and 305 m antenna height and a proposed station operating at 62 w ERP and 54 m antenna height is 93 km (Case 1) and the station separation calculated for an existing station operating at 62 w/54 m and a proposed station operating at 500 w/305 m is 109 km (Case 2). In this instance, under the Joint Commenters' proposed Table, both entries would be the 109 km distance calculated using the Case 2 parameters.

<sup>15</sup> Comments of Joint Commenters, Exhibits 4 and 5.

<sup>16</sup> Comments of Fleet Call at 5 and 7.

<sup>17</sup> Notice of Proposed Rule Making, PR Docket No. 93-144, released June 9, 1993, 8 FCC Rcd 3959 (1993).

<sup>18</sup> Reply Comments of Fleet Call at 7.

<sup>19</sup> Comments of Alexandria at ¶ 6.

<sup>20</sup> The current short-spacing table was established to provide a conservative procedure for applicants wishing to short-space without seeking a waiver of Section 90.621(b). The table thus provided protection to existing stations in accordance with a 40/22 dBu interference criteria and assumed that existing stations were operating at maximum facilities (i.e., 1000 watts and 305 meters). However, the table, and the parameters used in creating the table, did not establish our co-channel interference criteria. That criteria was reflected in our adopted procedures for those seeking a waiver of Section 90.621(b). In these procedures we indicated that such applicants need only provide 40/30 dBu protection to existing stations (see Report and Order, PR Docket No. 90-34, 6 FCC Rcd 4929, note 41).

with the Commission's current policy applicable to requests for waiver of Section 90.621(b). In our *Report and Order* in PR Docket No. 90-34, we indicated that protection criteria would be calculated using an existing co-channel licensee's maximum permissible transmitting power and its actual height.<sup>21</sup> We, therefore, are adopting a Short-Spacing Separation Table, derived from a 40/22 dBu protection criteria that specifies separations between proposed and existing stations determined from using a proposed station's intended transmitting ERP and antenna directional height above average terrain (DHAAT), and assuming that an existing station is transmitting with a maximum allowable ERP of 1000 watts at its licensed antenna height (and resultant DHAAT). The Table does not provide for station separations less than 88 km (55 mi). We believe that this approach offers a balance between increased spectrum efficiency, adequate co-channel protection, and administrative convenience.

#### Alternative Showings/Waiver Requests

14. The Joint Commenters state that there may be situations where the use of a short-spacing table may be inefficient or inappropriate. They propose that an applicant should have the option of an "alternative showing" under criteria similar to those provided for in PR Docket No. 90-34 for applicants seeking waiver of Section 90.621(b) of our Rules.<sup>22</sup> Fed Ex agrees that applicants should be required to comply with the separations in the Table, but proposes that exceptions to the Table be considered by a waiver request supported by an engineering submission, using procedures other than R-6602 and based on 40/22 dBu criteria, and taking extenuating terrain features into consideration.<sup>23</sup> Fed Ex further proposes that waiver requests should be accompanied by a statement that the applicant has attempted to reach consensus among affected co-channel licensees.<sup>24</sup> UTC also proposes that an applicant have the option of using the Table or determining the distance based on actual contours.<sup>25</sup>

15. We believe that the new rules and Table that we are adopting will accommodate the vast majority of applications for short-spacing co-channel stations, while protecting existing operations. We note, however, that unusual circumstances, such as the effects of terrain shielding, may justify occasional exceptions to the Table. If an applicant can justify that a lesser separation than that indicated in the Table will result in equal or greater protection to an existing station, it may request a waiver. No special provisions in the rules, however, will be made for alternative showings. With respect to Fed Ex's proposal that waiver requests be accompanied by a statement of attempted co-channel consensus, we do not believe that such a statement is necessary. Applicants requesting waivers of the Table are currently required to serve all co-channel licensees with such applications and supporting material, and those licensees will have an opportunity to oppose these requests. See 47 C.F.R. § 90.621(b)(4). Furthermore, in view of the

consensual provisions of Section 90.621(b)(5) that facilitates granting of short-space requests, our knowledge of unsuccessful attempts to obtain consensus serves little purpose.

#### Propagation Prediction Methodology

16. The *Notice* requested detailed comments on whether the Commission's R-6602 curves are adequate or if another methodology would be more suitable for determining the separations in typical land mobile propagation predictions. Eleven commenters addressed this issue. While not specifically recommending its use, Region-20 submitted comments with calculations based upon the Bullington model. As discussed previously, the Joint Commenters propose modified use of the R-6602 curves. UTC states that a more accurate methodology for predicting field strength should be implemented, but makes no specific recommendation.<sup>26</sup> E.F. Johnson states that R-6602 is administratively convenient, but that flat and high elevation terrain factors need to be included to obtain a more accurate reflection of protection requirements.<sup>27</sup> TUE, SCE, CEC, and SCG all favor the replacement of R-6602 with NBS Tech Note 101.<sup>28</sup> Fed Ex comments that while R-6602 does not represent the realities of RF propagation in the land mobile environment, the relative simplicity of applying a table to a short-space situation outweighs the complexity and ambiguities inherent in attempting to apply a modern terrain-based propagation model to each and every proposed short-spaced station.<sup>29</sup> CEC recommends discarding the use of R-6602 because the R-6602 methodology does not consider interference to base station receivers, and that any replacement methodology consider this factor.<sup>30</sup> Motorola states that R-6602 often does not reliably predict the extent of a licensee's service area and proposes that any review and analysis of a replacement propagation model should be addressed separately from this proceeding.<sup>31</sup>

17. An analysis of the comments indicates that there is no clear consensus as to whether the continued use of R-6602 is justified or what the replacement propagation analysis model should be. While the comments do provide arguments concerning claimed deficiencies in the R-6602 methodology, the administrative convenience coupled with the lack of a clear mandate as to a replacement lead us to conclude that a decision in this matter cannot be made at this time. Because of the importance of this issue along with the technical complexities involved, we concur with Motorola that this issue should be addressed in a separate proceeding. We, therefore, are deferring action on this issue until a later date.

#### Interference To/From Mobile Units

18. During the petition stage of this proceeding, commenters claimed that harmful interference could occur both to and from mobile units when co-channel stations operating at distance separations determined under the old

<sup>21</sup> See *Report and Order*, PR Docket No. 90-34, 6 FCC Rcd 4929 (1993), note 41.

<sup>22</sup> Comments of Joint Commenters at 17.

<sup>23</sup> Comments of Fed Ex at 4.

<sup>24</sup> Comments of Fed Ex at 4.

<sup>25</sup> Comments of UTC at 6.

<sup>26</sup> Comments of UTC at 4.

<sup>27</sup> Comments of E.F. Johnson at 6.

<sup>28</sup> Comments of TUE at 6, SCE at 5, Reply Comments of

CECo at 4, and SCG at 3.

<sup>29</sup> Comments of Fed Ex at 2.

<sup>30</sup> Comments of CEC at 2.

<sup>31</sup> Comments at Motorola at 5. It should be noted that, although Motorola suggests that the issue of a new propagation prediction model be addressed separately at a later date, as a member of the Joint Commenters, it supports their proposed modified use of R-6602 at this time.

40/30 dBu criteria. In the *Notice*, we indicated that the proposed use of the 40/22 dBu criteria would do much to minimize co-channel interference from mobile units to short-spaced base stations. We asked for comments on this issue, specifically as to what effect limiting mobile ERP may have, and any other factors that may contribute to potential interference to or from mobile units.

19. Commenters addressing this issue presented varying views. Region-20 states that the 40/22 dBu base-to-base protection criteria will not be adequate to minimize co-channel harmful interference from short-spaced mobile stations to existing base station receivers.<sup>32</sup> Fleet Call claims that there is concern that mobiles operating at and beyond the reliable service contour of their own base stations may cause harmful interference to non-affiliated co-channel base stations, and that the Commission must be certain that permitting closer spacing of SMR systems does not exacerbate co-channel interference to authorized SMR systems.<sup>33</sup> The Joint Commenters state that their proposed separation table will help reduce potential for mobile interference because it is more conservative than the current Table based on the 40/22 dBu criteria. The Joint Commenters add that, to provide additional protection, mobiles in a system with low ERP (less than 100 watts) could be limited to 6 dB less than the base station or repeater ERP. UTC claims that no additional protection is necessary with the 40/22 dBu Table.<sup>34</sup> E.F. Johnson argues that the 40/22 dBu criteria will help alleviate mobile interference concerns, but that the Commission may wish to revisit this issue as low-power systems proliferate.<sup>35</sup> Fed Ex claims that the majority of land mobile radio stations today still exhibit a base station transmit advantage, and that any reduction in mobile transmit power would only degrade system performance.<sup>36</sup>

20. As in any base/mobile radio system, there is always the possibility that far-ranging mobiles may cause interference to another system's co-channel base station receivers. Utilizing 40/22 dBu protection, a mobile unit operating at the edge of its base station's service area should still be sufficiently far from a co-channel base station receiver to minimize the potential for interference. Furthermore, to minimize interference from mobiles that may operate beyond their service area, our Table provides that co-channel base stations will not be permitted to be located closer than 88 km (55 mi) from each other. The Joint Commenters also state that to provide additional protection from potential mobile interference, the Commission could consider that in low-power systems (less than 100 watts ERP) mobiles be limited to an ERP that is 6 dB less than the system

ERP. We believe that this approach would severely limit the effectiveness of low-power systems that already have low-power base stations. To further lower the mobile power could make such systems almost unusable. Therefore, while we acknowledge the potential of interference from mobile units, we do not believe that there is sufficient justification to place any additional limits on mobile power.<sup>37</sup>

#### Miscellaneous Issues

21. *Reduction of maximum transmitter power and antenna height.* We asked for comment on whether there would be any significant advantage if the maximum station parameters of 1000 watts ERP and 305 m (1000 ft) antenna height were reduced. While most commenters did not offer opinions, UTC suggests that the current maximum facility parameters should be retained. Absent strong arguments regarding these parameters, we will retain the maximum transmitter power/antenna height limits currently in the Rules.

22. *Consolidation of certain rules.* We also asked for comments on whether separate rules are still needed for various types of stations having different operational modes, locations, and service area requirements. Again, most commenters did not address this issue. E.F. Johnson, however, while recognizing that separate rules governing different types of systems are burdensome, suggests that the proposed Table addresses many of the concerns regarding different types of stations.<sup>38</sup> Fed Ex also recommends using the same ERP/AAT ratios for both conventional and trunked systems, and suggests removing system differentiation terminology in the current Rules that relate to the high elevation sites described in Sections 90.621(b)(1), (b)(2), and (b)(3).<sup>39</sup> While we believe there is merit to consolidating the rules that provide for certain transmitter powers, antenna heights, and areas of service for different types of private land mobile radio systems, we will delay any such efforts to a subsequent proceeding that sets forth specific and detailed proposals for commenters to focus upon. Accordingly, in this proceeding we will retain Part 90, Subpart S rules in their current form except to the extent that they are otherwise amended by the specific proposals adopted herein.<sup>40</sup>

23. *High elevation stations.* The Joint Commenters suggest that co-channel station separations greater than 113 km (70 mi) be afforded to all stations located at very high elevations and offer three proposed methods for calculating the

<sup>32</sup> Comments of Region-20 at 2.

<sup>33</sup> Comments of Fleet Call at 6.

<sup>34</sup> Comments of UTC at 8.

<sup>35</sup> Comments of E.F. Johnson at 9.

<sup>36</sup> Comments of Fed Ex at 6.

<sup>37</sup> The separation distances in the Table are provided primarily to minimize base-to-mobile interference. Because the Table truncates at 88 km (55 mi) due to the potential for mobile-to-base interference, any waivers requesting separations less than this distance must include an analysis of the potential for such interference.

<sup>38</sup> Comments of E.F. Johnson at 8.

<sup>39</sup> These rule sections denote separation distances at specified high elevation sites in California and Washington only for trunked systems. When the 800 MHz rules were established in PR Docket No 79-191, we stated that it was our intention to provide interference protection to licensees of exclusive chan-

nels, and that licensees on non-exclusive channels would not be protected from other co-channel users. Therefore, because trunked systems are assigned on an exclusive basis, Sections 90.621(b)(1), (b)(2), and (b)(3) were adopted referencing separations only for trunked systems. There may, however, be conventional systems at high elevations sites specified in the Rules that either have or will obtain sufficient mobile loading to qualify for exclusivity. Therefore, to enable such a conventional system to enjoy the same protection criteria as a trunked system, we are amending Sections 90.621(b)(1), (b)(2), and (b)(3) to extend the additional separation to all stations that have been afforded exclusivity.

<sup>40</sup> Additionally, with the adoption, in this proceeding, of short-spacing protection based on the 40/22 dBu criteria, we amend Section 90.621(b)(6) to now protect those stations identified in this section in accordance with a 22 dBu interference contour rather than a 30 dBu interference contour.

appropriate separation distances for these stations.<sup>41</sup> SCG also contends that rule exemptions governing co-channel separations, transmitter power levels, and antenna heights should be developed specifically for stations west of the Continental Divide.<sup>42</sup> The issue raised by the Joint Commenters and SCG -- that of providing co-channel separation distances of greater than 113 km (70 mi) for high elevation sites -- is complex and also deserves the attention of interested parties for comments on specific and detailed proposals set forth for their consideration. Here, however, we do not have adequate information on which to base a change to our current 113 km (70 mi) protection standard in the current rules. Accordingly, this issue also must be delayed until another proceeding is initiated to explore specific proposals relative to 800/900 MHz stations at high elevations.

24. There may be instances, however, when a proposed station desires to short-space to an existing station (i.e. locate less than 113 km (70 mi) from an existing station) where either one or both of the stations are at very high elevations. In addressing this instance, we considered the Joint Commenters' three suggested distance calculation methods. After review of the methods, we conclude that the Joint Commenters' DHAAT/Linear method should be used to determine the necessary station separation required to obtain additional protection when short-spacing stations at very high elevation sites. We, therefore, will adopt its use. This procedure requires the calculation of the DHAAT of each existing co-channel station within 169 km (105 mi) of the proposed facility both towards the proposed facility and vice versa. For DHAAT values greater than 458 m (1500 ft), the required separation given in the Table for 305 m (1000 ft) is used, and 1.6 km (1 mi) is added for every 30.5 m (100 ft), or increment thereof, of DHAAT above 458 m (1500 ft). When both the existing and proposed stations have DHAAT's in excess of 458 m (1500 ft), the additional distances must be separately determined for each station and the combined distances are added to the distance obtained from the Table. Separations thus determined, however, shall not exceed 113 km (70 mi). Accordingly, we are adopting a rule that permits increased co-channel separations for stations desiring to be short-spaced when high elevation sites at any location in the country are involved. The Commission will employ this procedure when analyzing short-spacing requests and will require that the relevant coordinators do the same.

25. *Mexican border offset channels.* By agreement with Mexico, the 811-816/856-861 MHz band is assigned for exclusive U.S. use in the U.S./Mexico border area. Also, the 816-821/861-866 MHz frequency band is shared in the U.S./Mexico border zone by both countries, with each country assigned alternate frequencies. Frequencies in both of these bands are offset by 12.5 kHz from the primary frequencies used in the United States outside of the border zone.<sup>43</sup> In their comments, the Joint Commenters state that because the Rules make no provision for station separations and interference protection between the offset and primary channels, stations on primary channels have been

licensed in close proximity to existing stations on offset channels. The Joint Commenters further argue that with the advent of digital modulation, the use of 12.5 kHz offsets becomes essentially the same as co-channel operation because a large portion of one transmitter's energy falls in-band to a receiver offset by 12.5 kHz. They then propose that offset operations in the Mexican border region be treated as co-channel with each overlapping primary frequency, and that any new authorizations should meet the adopted co-channel short-spacing criteria.<sup>44</sup> Fleet Call and AMI endorse the Joint Commenters proposal.<sup>45</sup>

26. The Joint Commenters state that under current rules, it would be possible to authorize operations on offset and primary channels at close distances, thus greatly increasing the chances of interference between such stations. The inherent protection of about 10 dB obtained because of the 12.5 kHz frequency separation would not be sufficient if the stations were closely spaced.<sup>46</sup> Fleet Call and AMI, in reply comments, support the Joint Commenters' suggestion.<sup>47</sup> On this issue, we concur with the commenters and are amending our rules, therefore, to require that applications for stations located adjacent to the U.S./Mexico border area that request frequencies in the 811-821/856-866 MHz band must consider existing stations in the U.S./Mexico border area that operate on offset frequencies 12.5 kHz removed as co-channel stations. Such applications will be required to comply with the co-channel separation provisions of Section 90.621(b). Existing authorizations as of the adoption date of the instant rule making will be grandfathered.

#### IV. CONCLUSION

27. In this *Report and Order*, we are adopting rule changes that will maximize the availability of short-spacing options for all Part 90, Subpart S stations operating above 800 MHz, while at the same time providing adequate interference protection to co-channel licensees. We believe that this action will simplify the rules concerning both SMR and non-SMR systems and, from a licensing standpoint, will significantly reduce the burden upon both the applicant and the Commission.

28. On November 11, 1992 the Chief, Private Radio Bureau issued an Order (DA 92-1570) announcing that the Bureau would, until further notice, return without action all applications requesting waiver of Section 90.621(b) of the Commission's Rules. In the *Notice* in this proceeding, we announced that, until the proceeding is terminated, we would not accept applications for 800/900 MHz systems, both SMR and non-SMR, unless such applications met the conditions set forth in Section 90.621(b). With the termination of this proceeding and the adoption of new rules under Section 90.621(b), we will, on the effective date of the rules adopted in this *Report and Order*, once again accept those applications whose receipt was suspended by the Private Radio Bureau's Order (DA 92-1570) and the *Notice* in this proceeding.

<sup>41</sup> Comments of Joint Commenters at 11-15. The three methods are called, DHAAT/Radio Horizon, DHAAT/Linear, and Fixed Mileage/HAAT.

<sup>42</sup> Reply Comments of SCG at 8-10.

<sup>43</sup> The use of offset frequencies permits frequencies to be used in the border zone that would not be normally be permitted because of the 105 mile reuse restriction of Section 90.621(b)(1)

of the Rules.

<sup>44</sup> Comments of Joint Commenters at 15-17.

<sup>45</sup> Comments of Fleet Call at note 11 and Reply Comments of AMI at 2.

<sup>46</sup> Comments of Joint Commenters at 15-17.

<sup>47</sup> Reply Comments of Fleet Call at 8, and AMI at 2-4.

**V. FINAL REGULATORY FLEXIBILITY ANALYSIS**

29. Pursuant to the Regulatory Flexibility Act of 1980, the Commission's final analysis is as follows:

**Need for and Purpose of this Action**

30. This *Report and Order* amends Part 90 of the Commission's Rules to revise the interference protection criteria and separations for co-channel private land mobile radio stations operating above 800 MHz. This action will simplify the rules concerning these stations and will reduce the burden on both the applicant and the Commission during the application procedure.

**Issues Raised in Response to the Initial Regulatory Flexibility Analysis**

31. None of the commenters specifically addressed the Initial Regulatory Flexibility Analysis.

**Significant Alternatives Considered and Rejected**

32. The Commission considered all of the alternatives in this proceeding and considered all of the timely filed comments in the *Notice of Proposed Rule Making*. Aside from maintaining the *status quo*, there are no alternatives other than considered in this *Report and Order*.


**VI. ORDERING CLAUSES**

33. Accordingly, IT IS ORDERED that, pursuant to the authority of Sections 4(i), 303(r), and 332(a)(2) of the Communications Act of 1934, as amended, 47 U.S.C. §§ 154(i), 303(r), and 332(a)(2), Part 90 of the Commission's Rules, 47 C.F.R. Part 90, IS AMENDED as set forth in the Appendix below effective [thirty days after publication in the Federal Register].

34. IT IS FURTHER ORDERED that, effective [30 days after publication in the Federal Register], the suspension of the receipt of applications for 800/900 MHz systems not in accordance with the conditions set forth in 47 C.F.R. § 90.621(b), as ORDERED in the *Notice*, PR Docket No. 93-60, para. 24, 8 FCC Rcd 2454 (1993) and the suspension of the receipt of applications for SMR systems not in accordance with 47 C.F.R. § 90.621(b), as ORDERED in the *Order*, DA 92-1570, 7 FCC Rcd 7659 (1992), ARE TERMINATED.

35. IT IS FURTHER ORDERED that this proceeding is TERMINATED.

FEDERAL COMMUNICATIONS COMMISSION



William F. Caton  
Acting Secretary

**APPENDIX**

Part 90 of Chapter I of Title 47 of the Code of Federal Regulations is amended as follows:

**PART 90 - PRIVATE LAND MOBILE RADIO SERVICES**

1. The authority citation for Part 90 continues to read as follows:

**Authority:** Secs. 4, 303, and 332, 48 Stat. 1066, 1082, as amended, 47 U.S.C. 154, 303, and 332, unless otherwise noted.

2. Section 90.621 is amended by revising paragraph (b) introductory text, paragraph (b)(1), the first sentence of paragraph (b)(2) introductory text, the first sentence of paragraph (b)(3), paragraph (b)(4), paragraph (b)(6), adding paragraph (b)(7), removing paragraphs (c) and (d), and redesignating paragraphs (e), (f), (g), (h), (i) and (j) as paragraphs (c), (d), (e), (f), (g) and (h), respectively, to read as follows:

**§ 90.621 Selection and assignment of frequencies.**

\* \* \* \* \*

(b) Stations authorized on frequencies listed in this Subpart, except for those stations authorized pursuant to paragraph (g) of this section, will be afforded protection solely on the basis of fixed distance separation criteria. The separation between co-channel systems will be a minimum of 113 km (70 mi) with the following exceptions:

(1) Except as indicated in paragraph (b)(4) of this section, no station shall be less than 169 km (105 mi) distant from a co-channel station that has been granted channel exclusivity and authorized 1 kW ERP on any of the following mountaintop sites: Santiago Peak, Sierra Peak, Mount Lukens, Mount Wilson (California).

(2) The separation between co-channel stations that have been granted exclusivity and that are located at high sites in California north of 35°N Latitude and west of 118°W Longitude shall be determined as follows: \* \* \*

(3) Except as indicated in paragraph (b)(4) of this section, stations that have been granted channel exclusivity and are located in the State of Washington at the following locations shall be separated from co-channel stations by a minimum of 169 km (105 mi). \* \* \*

(4) Upon an applicant's specific request to the Commission or a frequency coordinator, co-channel stations may be separated by less than 113 km (70 mi) by meeting certain transmitter ERP and antenna height criteria. The following Table indicates separations assignable to such co-channel stations for various transmitter power and antenna height combinations. The minimum separation permitted is 88 km (55 mi). Applicants will provide the Commission with a statement that the application is submitted for consideration under the Table, a list of all co-channel stations within 113 km (70 mi), and the DHAATs and ERPs for these stations and the applicant's proposed station. Applicants seeking to be licensed for stations located at distances less than those prescribed in

the Table are required to secure a waiver and must submit with the application, in addition to the above, an interference analysis, based upon any of the generally-accepted terrain-based propagation models, that shows that co-channel stations would receive the same or greater interference protection than provided in the Table. Requests for separations less than 88 km (55 mi) must also include an analysis of interference potential from mobile transmitters to existing co-channel base station receivers. Applicants seeking a waiver must submit with their application a certificate of service indicating that concurrent with the submission of the application to the Commission or a coordinator, all co-channel licensees within the applicable area were served with a copy of the application and all attachments thereto. Licensees thus served may file an opposition to the application within 30 days from the date the application is filed with the Commission.

(i) The directional height of the antenna above average terrain (DHAAT) is calculated from the average of the antenna heights above average terrain from 3 to 16 km (2 to 10 mi) from the proposed site along a radial extending in the direction of the existing station and the radials 15 degrees to either side of that radial.

(ii) Except for the sites listed in paragraphs (b)(1), (b)(2), and (b)(3) of this section, additional co-channel distance separation must be afforded to an existing station from an applicant wishing to locate a station less than 113 km (70 mi) from a co-channel station, where either the applicant's or the existing station is located at sites with DHAATs of 458 m (1500 ft) and above. The separation between short-spaced co-channel stations shall be determined as follows:

(A) Calculate the DHAAT in each direction between every existing co-channel station within 113 km (70 mi) and the proposed station.

(B) In the Table, locate the approximate ERP and DHAAT values for the proposed and existing stations.

(C) When DHAAT values are greater than 458 m (1500 ft), use the required separation for 305 m (1000 ft) and add 1.6 km (1 mi) for every 30.5 km (100 ft), or increment thereof, of DHAAT above 458 m (1500 ft) to the distance indicated in the Table. If both the proposed and existing stations have DHAATs of 458 m (1500 ft) or more, the additional distance is separately determined for each station and the combined distance is added to the distance obtained from the Table. Protection to existing stations will be afforded only up to 113 km (70 mi).

SHORT-SPACING SEPARATION TABLE

Proposed Station ERP (watts) / DHAAT (m) <sup>3</sup>	Distance Between Stations (km) <sup>1 2</sup>						
	Existing Station DHAAT (meters) <sup>3</sup>						
	305	215	150	108	75	54	37
1000/305	113	113	113	113	113	113	113
1000/215	113	113	113	113	113	113	110
1000/150	113	113	113	113	112	108	103
1000/108	113	113	113	110	107	103	98
1000/75	113	112	108	103	100	96	91
1000/54	113	109	105	100	97	93	88
1000/37	109	104	100	95	92	88	88
500/305	113	113	113	113	113	113	110
500/215	113	113	113	112	109	105	100
500/150	113	112	108	103	100	96	91
500/108	112	107	103	98	95	91	88
500/75	107	102	98	93	90	88	88
500/54	103	98	94	89	88	88	88
500/37	99	94	90	88	88	88	88
250/305	113	113	113	112	109	105	100
250/215	113	113	107	102	99	95	90
250/150	109	104	100	95	92	88	88
250/108	105	100	96	91	88	88	88
250/75	99	94	90	88	88	88	88
250/54	95	90	88	88	88	88	88
250/37	91	88	88	88	88	88	88
125/305	113	111	107	102	99	95	90
125/215	108	103	99	94	91	88	88
125/150	103	98	94	89	88	88	88
125/108	98	93	89	88	88	88	88
125/75	93	88	88	88	88	88	88
125/54	88	88	88	88	88	88	88
125/37	88	88	88	88	88	88	88
62/305	108	103	99	94	91	88	88
62/215	103	98	94	89	88	88	88
62/150	97	92	88	88	88	88	88
62/108	92	88	88	88	88	88	88
62/75	88	88	88	88	88	88	88
62/54	88	88	88	88	88	88	88
62/37	88	88	88	88	88	88	88

<sup>1</sup> Separations for stations on Santiago Peak, Sierra Peak, Mount Lukens, and Mount Wilson (CA) and the locations in the State of Washington listed in § 90.621(b)(3) are 56 km (35 mi) greater than those listed in the Table above. In the event of conflict between this

Table and the table of additional California high elevation sites shown in § 90.621(b) (2), the latter will apply.

<sup>2</sup> Distances shown are derived from the R-6602 curves and are based upon a non-overlap of the 22 dBu (F50,10) interference contour of the proposed station with the 40 dBu (F50,50) contour of the existing station(s). No consideration is given to the 40 dBu service contour of the proposed station and the 22 dBu contour of the existing station(s). The minimum separation of stations will be 88 km (55 mi).

<sup>3</sup> All existing stations are assumed to operate with 1000 watts ERP. When the ERP and/or DHAAT of a proposed station or the DHAAT of an existing station is not indicated in the Table, the next higher value(s) must be used.

\* \* \* \* \*

(6) A station located closer than the distances provided in this section to a co-channel station that was authorized as short-spaced under paragraph (b) (4) of this section shall be permitted to modify its facilities as long as the station does not extend its 22 dBu contour beyond its maximum 22 dBu contour (i.e., the 22 dBu contour calculated using the station's maximum power and antenna height at its original location) in the direction of the short-spaced station.

(7) Offset frequencies in the 811-821/856-866 MHz band for use only within the U.S./Mexico border area, as designated in Section 90.619(a), shall be considered co-channel with non-offset frequencies in this band as designated in Section 90.613. New applications for frequencies in this band for stations adjacent to the U.S./Mexico border area must comply with the co-channel separation provisions of this section.

\* \* \* \* \*